ENERGY PRODUCTION AND MANAGEMENT

The total area of solar panel is 11240 m². Given current capture rates of comparable technology and the weather data provided, our team has estimated that solar panels can harness approximately 80% of the potential energy. The area and rated output of solar panels we assumed are 3 m²/pack and 300 W/panel, respectively. About 1.7 MW solar panels can be installed in the design area. Annual power generation was estimated on the basis of annual global solar exposure (kWh/year/m²) and the efficiency.

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\text{1.72 \left(\text{kWh/year/m²}\right) \times 11240 \left(\text{m²}\right) \times 0.15 = 2,900,000 \text{ kWh/year}}
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(Annual global solar exposure) x (Design area) x (Efficiency) = (Annual power generation)

The area and capacity of lithium-ion battery we assumed are 0.1 m²/pack and 1.7 kWh/pack, respectively. About 200 kWh batteries installation was assumed in this design area. We have estimated that the energy system with 1.7 MW solar panels and 200 kWh batteries can cover about 2000 kWh/year electricity demand according to the calculation based on daily profile of global solar exposure (kWh/day/m²).

For one Solar Palm Tree, taken the average efficiency of 22.5%, for eight units of leaf with leaf’s dimension of 4m², the annual power generation is about 10,000 kWh/year.

ABOUT THE SITE

The site's triangular plan has been well-known as a symbol of the planning reconciliation between the local community and the developer, as fitted in The Triangle Mews, featuring thousands of passionate people from St Kilda. Despite the adjacent historic icons, the Lunar Park and the Palais Theatre, the notion of “St Kilda triangle” has been gradually forming a secondary icon of the locale in a collective memory. As the local community demanded more open public space that can flexibly accommodate a wide range of civil events and social activities, one may envisage a form that takes the opportunity of integrating renewable energy generation into the public space with an easily identifiable appearance showcasing the local identity.

The efficiency of the flexible Palm Tree solar firm is around 20-25%, which is about 30% higher than traditional solar panels.

In addition, this design collects the solar energy with less occupation of ground space compared with ground-stand solar panels. It can supply the power for lighting during night and other electrical facilities around with excessive power, recycle and save the water resource, and provide shades in summer. Both the location and size of the Solar Palm Tree can be flexible based on varying demands.